CLAIMS

What is claimed is:

1. An engine control system that controls operation of an internal combustion engine, comprising:

an intake manifold that is adjustable to a plurality of resonance geometric configurations; and

a controller that monitors engine operation, that classifies engine operation in one of a plurality of operational categories and that adjusts said intake manifold to a resonance geometric configuration associated with said operational category.

2. The engine control system of claim 1 wherein said resonance geometric configurations include a tuned configuration and a detuned configuration.

3. The engine control system of claim 1 wherein each of said operational categories is based on an engine load.

4. The engine control system of claim 3 further comprising a commanded load input that generates a load command, wherein said controller determines whether an engine load is one of a partial load and a full load based on said load command.

5. The engine control system of claim 4 wherein said controller adjusts said intake manifold to a first resonance geometric configuration if said engine load is said partial load and adjusts said intake manifold to a second resonance geometric configuration if said engine load is said full load.

6. The engine control system of claim 3 wherein each of said operational categories is further based on an engine speed.

7. The engine control system of claim 6 further comprising an engine speed sensor that measures said engine speed, wherein said controller compares said engine speed to a threshold engine speed to determine whether said engine speed is one of a high engine speed and a low engine speed.

8. The engine control system of claim 7 wherein said threshold engine speed is an engine speed at which a volumetric efficiency of said engine is constant regardless of said resonance geometric configuration.

9. The engine control system of claim 8 wherein said threshold engine speed is based on engine load.

10. The engine control system of claim 7 wherein said controller adjusts said intake manifold to a first resonance geometric configuration if said engine load is a partial load and said engine speed is less than said threshold engine speed, adjusts said intake manifold to a second resonance geometric configuration if said engine load is said partial load and said engine speed is greater than said threshold engine speed, adjusts said intake manifold to said first resonance geometric configuration if said engine load is a full load and said engine speed is greater than said threshold engine speed and adjusts said intake manifold to said second resonance geometric configuration if said engine load is said full load and said engine speed is less than said threshold engine speed.

11. The engine control system of claim 1 further comprising:

a tuning valve that is movable between an open position to provide a first resonance geometric configuration and a closed position

to divide said intake manifold into multiple plenums and to provide a second resonance geometric configuration; and

an actuator that manipulates said tuning valve based on a signal from said controller.

12. A method for controlling an internal combustion engine having an intake manifold that is adjustable to a plurality of acoustic resonance geometric configurations, comprising:

defining a plurality of operational categories for said engine;

defining a resonance geometric configuration associated with each of said operational categories;

classifying engine operation in an operational category of said operational categories; and

adjusting said intake manifold to said resonance geometric configuration defined for said operational category.

13. The method of claim 12 wherein said resonance geometric configurations include a tuned configuration and a detuned configuration.

14. The method of claim 12 wherein each of said operational categories is based on an engine load.

15. The method of claim 14 wherein each of said operational categories is further based on an engine speed.

16. The method of claim 12 wherein said step of adjusting said intake manifold comprises:

moving a tuning valve to an open position to provide a first resonance geometric configuration; and

moving a tuning valve to a closed position to divide said intake manifold into multiple plenums and to provide a second resonance geometric configuration.

17. The method of claim 12 further comprising:

determining whether an engine load is one of a partial load and a full load based on a load command;

adjusting said intake manifold to a first resonance geometric configuration if said engine load is said partial load; and

adjusting said intake manifold to a second resonance geometric configuration if said engine load is said full load.

18. The method of claim 12 further comprising:

measuring a load command;

determining whether an engine load is one of a partial load and a full load based on said load command;

measuring an engine speed;

comparing said engine speed to a threshold engine speed;

adjusting said intake manifold to a first resonance geometric configuration if said engine load is said partial load and said engine speed is less than said threshold engine speed;

adjusting said intake manifold to a second resonance geometric configuration if said engine load is said partial load and said engine speed is greater than said threshold engine speed;

adjusting said intake manifold to said first resonance geometric configuration if said engine load is said full load and said engine speed is greater than said threshold engine speed; and

adjusting said intake manifold to said second resonance geometric configuration if said engine load is said full load and said engine speed is less than said threshold engine speed.

19. The method of claim 18 wherein said threshold engine speed is an engine speed at which a volumetric efficiency of said engine is constant regardless of said resonance geometric configuration.

20. The method of claim 19 wherein said threshold engine speed is based on engine load.

21. An engine control system that controls operation of an internal combustion engine, comprising:

a load input that generates a load command signal;

an intake manifold that is adjustable to a plurality of resonance geometric configurations and that includes:

a tuning valve that is adjustable to provide a first resonance geometric configuration and a second resonance geometric configuration; and

an actuator that manipulates a position of said tuning valve; and

a controller that monitors engine operation, that classifies engine operation in one of a plurality of operational categories and that signals said actuator to adjust said to provide one of said first and second resonance geometric configurations.

22. The engine control system of claim 21 wherein said first and second resonance geometric configurations include a tuned configuration and a detuned configuration.

23. The engine control system of claim 21 wherein each of said operational categories is based on an engine load.

24. The engine control system of claim 23 wherein said controller determines whether said engine load is one of a partial load and a full load based on said load command.

25. The engine control system of claim 24 wherein said controller adjusts said intake manifold to said first resonance geometric configuration if said engine load is said partial load and adjusts said intake manifold to said second resonance geometric configuration if said engine load is said full load.

26. The engine control system of claim 23 wherein each of said operational categories is further based on an engine speed.

27. The engine control system of claim 26 further comprising an engine speed sensor that measures said engine speed, wherein said controller compares said engine speed to a threshold engine speed to determine whether said engine speed is one of a high engine speed and a low engine speed.

28. The engine control system of claim 27 wherein said threshold engine speed is an engine speed at which a volumetric efficiency of said engine is constant regardless of said resonance geometric configuration.

29. The engine control system of claim 28 wherein said threshold engine speed is based on engine load.

30. The engine control system of claim 27 wherein said controller adjusts said intake manifold to said first resonance geometric configuration if said engine load is a partial load and said engine speed is less than said threshold engine speed, adjusts said intake manifold

to said second resonance geometric configuration if said engine load is said partial load and said engine speed is greater than said threshold engine speed, adjusts said intake manifold to said first resonance geometric configuration if said engine load is a full load and said engine speed is greater than said threshold engine speed and adjusts said intake manifold to said second resonance geometric configuration if said engine load is said full load and said engine speed is less than said threshold engine speed.

31. The engine control system of claim 21 wherein said tuning valve is a discrete position tuning valve that is movable between an open position to provide said first resonance geometric configuration and a closed position to divide said intake manifold into multiple plenums and to provide said second resonance geometric configuration.